

Mathematics



GRADE 1 MATH: NINA'S NUMBERS

UNIT OVERVIEW

This packet contains a curriculum-embedded CCLS aligned task and instructional supports. The task is embedded in a 2-3 week unit on Number and Operations in Base 10. The mathematics of the unit involves understanding the meaning of base ten and using that understanding to solve number and real life problems. Students will use a variety of tools to help articulate understanding of base ten and to solve problems using addition and subtraction of numbers less than 10, less than 20 and on to less than 100.

TASK DETAILS

Task Name: Nina's Numbers

Grade: 1

Subject: Math

Task Description: This task allows students to demonstrate their understanding of place value. Throughout the task they are required to use operations to solve problems, understand and apply properties of numbers, and compose and decompose numbers in flexible ways.

Standards Assessed:

1.NBT.2 Understand that the two digits of a two-digit number represent amount of tens and ones. Understand the following as special cases:

- a) 10 can be thought of as a bundle of ten ones – called a “ten.”
- b) The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
- c) The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

1.NBT.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.

1.NBT.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.

1.OA.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$).

Standards for Mathematical Practice:

MP.1 Make sense of problems and persevere in solving them

MP.2 Reason abstractly and quantitatively

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.7 Look for and make use of structure.



TABLE OF CONTENTS

The task and instructional supports in the following pages are designed to help educators understand and implement tasks that are embedded in Common Core-aligned curricula. While the focus for the 2011-2012 Instructional Expectations is on engaging students in Common Core-aligned culminating tasks, it is imperative that the tasks are embedded in units of study that are also aligned to the new standards. Rather than asking teachers to introduce a task into the semester without context, this work is intended to encourage analysis of student and teacher work to understand what alignment looks like. We have learned through the 2010-2011 Common Core pilots that beginning with rigorous assessments drives significant shifts in curriculum and pedagogy. Universal Design for Learning (UDL) support is included to ensure multiple entry points for all learners, including students with disabilities and English language learners.

PERFORMANCE TASK: NINA’S NUMBERS.....	3
UNIVERSAL DESIGN FOR LEARNING (UDL) PRINCIPLES	6
RUBRIC.....	8
SCORING GUIDE	9
PERFORMANCE LEVEL DESCRIPTIONS	10
ANNOTATED STUDENT WORK	11
INSTRUCTIONAL SUPPORTS	29
UNIT OUTLINE	30
INITIAL ASSESSMENT: PENCILS AND ERASERS	35
FORMATIVE ASSESSMENT: BASE TEN MENU	37
FORMATIVE ASSESSMENT: FORWARDS AND BACKWARDS.....	61
SUPPORTS FOR ENGLISH LANGUAGE LEARNERS	65
SUPPORTS FOR STUDENTS WITH DISABILITIES	69



GRADE 1 MATH: NINA'S NUMBERS PERFORMANCE TASK

Nina's Numbers

This problem gives you the chance to:

- show you understanding of whole numbers
-

Nina loves to play the Fill in the Blank games.

1. Write the numbers that belong in each blank.

a) 25, _____, 35, 40, _____, 50

b) 4, 7, _____, 13, _____, 19, _____, 25

2. Fill in the missing number to make this number sentence correct.

$$58 + \boxed{} = 65$$

Show your work using pictures, words, and numbers

Nina has three number cards.

5

3

8

3. What is the largest two-digit number Nina can make using these cards?

Write that number in the boxes below.

--	--

4. Using these same cards, what two-digit number can Nina make that is closest to 45?

Write that number in the boxes below.

--	--

Show how you figured it out using pictures, words, and numbers.



GRADE 1 MATH: NINA'S NUMBERS

UNIVERSAL DESIGN FOR LEARNING (UDL) PRINCIPLES

Nina's Numbers - Math Grade 1 Common Core Learning Standards/ Universal Design for Learning

The goal of using Common Core Learning Standards (CCLS) is to provide the highest academic standards to all of our students. Universal Design for Learning (UDL) is a set of principles that provides teachers with a structure to develop their instruction to meet the needs of a diversity of learners. UDL is a research-based framework that suggests each student learns in a unique manner. A one-size-fits-all approach is not effective to meet the diverse range of learners in our schools. By creating options for how instruction is presented, how students express their ideas, and how teachers can engage students in their learning, instruction can be customized and adjusted to meet individual student needs. In this manner, we can support our students to succeed in the CCLS.

Below are some ideas of how this Common Core Task is aligned with the three principles of UDL; providing options in representation, action/expression, and engagement. As UDL calls for multiple options, the possible list is endless. Please use this as a starting point. Think about your own group of students and assess whether these are options you can use.

REPRESENTATION: *The “what” of learning.* How does the task present information and content in different ways? How students gather facts and categorize what they see, hear, and read. How are they identifying letters, words, or an author's style?

In this task, teachers can...

- ✓ **Guide information processing, visualization and manipulation** by providing customized and embedded models, scaffolds, and feedback to assist learners who have very diverse abilities in using those strategies effectively.

ACTION/EXPRESSION: *The “how” of learning.* How does the task differentiate the ways that students can express what they know? How do they plan and perform tasks? How do students organize and express their ideas?

In this task, teachers can...

- ✓ **Vary the methods for response and navigation** by providing alternatives for physically responding to performance tasks in *Nina's Numbers* using teacher-made number cards, Smart Board and/or iPad technology to demonstrate understanding.

ENGAGEMENT: *The “why” of learning.* How does the task stimulate interest and motivation for learning? How do students get engaged? How are they challenged, excited, or interested?

In this task, teachers can...

- ✓ **Increase mastery-oriented feedback** by providing feedback that is substantive and informative rather than comparative and competitive.

Visit <http://schools.nyc.gov/Academics/CommonCoreLibrary/default.htm> to learn more information about UDL.



GRADE 1 MATH: NINA'S NUMBERS RUBRIC

The rubric section contains a scoring guide and performance level descriptions for the Nina's Numbers task.

Scoring Guide: The scoring guide is designed specifically to each small performance task. The points highlight each specific piece of student thinking and explanation required of the task and help teachers see common misconceptions (which errors or incorrect explanations) keep happening across several papers. The scoring guide can then be used to refer back to the performance level descriptions.

Performance Level Descriptions: Performance level descriptions help teachers think about the overall qualities of work for each task by providing information about the expected level of performance for students. Performance level descriptions provide score ranges for each level, which are assessed using the scoring guide.

Grade 1 Math: Nina's Numbers

Nina's Numbers Scoring Guide

	Nina's Numbers Grade 1:	Points	Section Points
	<p>The core elements of the performance required by this task are:</p> <ul style="list-style-type: none"> • Use operations to solve problems • Understand and apply properties of numbers • Compose and decompose numbers in flexible ways <p>Based on these credit for specific aspects of performance should be assigned as follows</p>		
1	<p>a). Gives correct answers: 30, 45</p> <p>b) Gives correct answers: 10, 16, 22</p> <p>All three correct</p> <p>1 or 2 correct</p>	<p>2x1</p> <p>2</p> <p>(1)</p>	 <p>4</p>
2	<p>Gives a correct answer: 7</p> <p>Show correct work such as:</p> <p>$65 - 58 = 7$</p>	<p>1</p> <p>1</p>	 <p>2</p>
3.	<p>Gives a correct answer: 85</p>	<p>1</p>	 <p>1</p>
4.	<p>Gives a correct answer: 38</p> <p>Show correct work such as:</p> <p>Indicates that 38 is closer to 45 than 53, 83 or 85</p>	<p>1</p> <p>1</p>	 <p>2</p>
	Total Points		9

Grade 1 Math: Nina's Numbers

Rubric

Performance Level Description and Cut Scores

Performance is reported at four levels: 1 through 4, with 4 as the highest.

Level 1: Demonstrates Minimal Success (0 – 2 points)

The student's response shows few of the elements of performance that the tasks demand as defined by the CCSS. The work shows a minimal attempt on the problem and struggles to make a coherent attack on the problem. Communication is limited and shows minimal reasoning. The student's response rarely uses definitions in their explanations. The student struggles to recognize patterns or the structure of the problem situation.

Level 2: Performance Below Standard (3 – 4 points)

The student's response shows some of the elements of performance that the tasks demand and some signs of a coherent attack on the core of some of the problems as defined by the CCSS. However, the shortcomings are substantial and the evidence suggests that the student would not be able to produce high-quality solutions without significant further instruction. The student might ignore or fail to address some of the constraints of the problem. The student may occasionally make sense of quantities in relationships in the problem, but their use of quantity is limited or not fully developed. The student response may not state assumptions, definitions, and previously established results. While the student makes an attack on the problem it is incomplete. The student may recognize some patterns or structures, but has trouble generalizing or using them to solve the problem.

Level 3: Performance at Standard (5 - 6 points)

For most of the task, the student's response shows the main elements of performance that the tasks demand as defined by the CCSS and is organized as a coherent attack on the core of the problem. There are errors or omissions, some of which may be important, but of a kind that the student could well fix, with more time for checking and revision and some limited help. The student explains the problem and identifies constraints. The student makes sense of quantities and their relationships in the problem situations. S/he often use abstractions to represent a problem symbolically or with other mathematical representations. The student response may use assumptions, definitions, and previously established results in constructing arguments. S/he may make conjectures and build a logical progression of statements to explore the truth of their conjectures. The student might discern patterns or structures and make connections between representations.

Level 4: Achieves Standards at a High Level (7 -9 points)

The student's response meets the demands of nearly all of the tasks as defined by the CCSS, with few errors. With some more time for checking and revision, excellent solutions would seem likely. The student response shows understanding and use of stated assumptions, definitions and previously established results in construction arguments. The student is able to make conjectures and build a logical progression of statements to explore the truth of their conjecture. The student response routinely interprets their mathematical results in the context of the situation and reflects on whether the results make sense. The communication is precise, using definitions clearly. The student looks closely to discern a pattern or structure. The body of work looks at the overall situation of the problem and process, while attending to the details.



GRADE 1 MATH: NINA'S NUMBERS

ANNOTATED STUDENT WORK

This section contains annotated student work at a range of score points and implications for instruction for each performance level (excluding the expert level). The student work and annotations are intended to support teachers, showing examples of student understandings and misunderstandings of the task. The annotated student work and implications for instruction can be used to understand how to move students to the next performance level.

Level 4: Achieves Standards at a High Level (Score Range 7 - 9)

The student's response meets the demands of nearly the entire task, with few errors. With some more time for checking and revision, excellent solutions would seem likely. The student response shows understanding and use of stated assumptions, definitions and previously established results in constructing arguments. The student is able to make conjectures and build a logical progression of statements to explore the truth of their conjecture. The student response routinely interprets their mathematical results in the context of the situation and reflects on whether the results make sense. The communication is precise, using definitions clearly. The students look closely to discern a pattern or structure. The body of work looks at the overall situation of the problem and process, while attending to the details.

Student A – Level 4 (Score 8)

Nina's Numbers

This problem gives you the chance to:

- show you understanding of whole numbers

Nina loves to play the Fill in the Blank games.

1. Write the numbers that belong in each blank.

a) 25, 30, 35, 40, 45, 50

b) 4, 7, 10, 13, 16, 19, 22, 25

2. Fill in the missing number to make this number sentence correct.

$$58 + \boxed{7} = 65$$

Show your work using pictures, words, and numbers

Student A correctly determines the values in the sequences of part 1. In part 2 the student correctly determine the missing value 7. The student's explanation is clear showing a counting on strategy, complete with fingers labeled.

1.NBT.E, 1.NBT.U1-3, 1.OA, MP2, MP3

Student A – Level 4 (Score 8) Page 2

Nina has three number cards.

5

3

8

3. What is the largest two-digit number Nina can make using these cards?

Write that number in the boxes below.

85 ✓

4. Using these same cards, what two-digit number can Nina make that is closest to 45?

Write that number in the boxes below.

35 ✓

Show how you figured it out using pictures, words, and numbers.

I found out
three is smaller
eight is smaller
five is smaller
because
and five then
and
then eight.

The student correctly places the digits to make the largest number possible. S/he selects a number close to 45 even though there is a closer number. The student explains by comparing the digits, first considering the hundred's place and then the ones place. 1NBT.U.2, MP2, MP3.

Student B – Level 4 (Score 7)

Nina's Numbers

This problem gives you the chance to:

- show you understanding of whole numbers

Nina loves to play the Fill in the Blank games.

1. Write the numbers that belong in each blank.

a) 25, 30 ✓, 35, 40, 45 ✓, 50

b) 4, 7, 10 ✓, 13, 16 ✓, 19, 22 ✓, 25

2. Fill in the missing number to make this number sentence correct.

$$58 + \boxed{6} = 65$$

Show your work using pictures, words, and numbers

I used my fingers to figure out the number six.

The student correctly complete the two counting sequences. The student's answer for finding the unknown was off by one. The student's explanation is understood but minimal. A more complete explanation would provide more insight into how the student miscounted. 1.NBT.E, 1.NBT.U1-3, MP2

Student B – Level 4 (Score 7) Page 2

Nina has three number cards.

5

3

8

3. What is the largest two-digit number Nina can make using these cards?

Write that number in the boxes below.

85 ✓

4. Using these same cards, what two-digit number can Nina make that is closest to 45?

Write that number in the boxes below.

38 ✓

Show how you figured it out using pictures, words, and numbers.

Because I used my brain
to help me.

The student accurately places the digits to find the largest possible number. In part 4 the student made more than one attempt and came up with the closest number to 45. But the student's explanation does not communicate anything of learning value. Students need to learn to explain what thinking goes on in their head.
1NBT.U.2, MP2, MP3

Level 3: Performance at Standard (Score Range 5 - 6)

For most of the task, the student's response shows the main elements of performance that the tasks demand and is organized as a coherent attack on the core of the problem. There are errors or omissions, some of which may be important, but of a kind that the student could well fix, with more time for checking and revision and some limited help. The student explains the problem and identifies constraints. The student makes sense of quantities and their relationships in the problem situations. They often use abstractions to represent a problem symbolically or with other mathematical representations. The student response may use assumptions, definitions, and previously established results in constructing arguments. They may make conjectures and build a logical progression of statements to explore the truth of their conjectures. The student might discern patterns or structures and make connections between representations.

Student C – Level 3 (Score 5)**Nina's Numbers**

This problem gives you the chance to:

- show you understanding of whole numbers

Nina loves to play the Fill in the Blank games.

1. Write the numbers that belong in each blank.

a) 25, 30✓, 35, 40, 45✓, 50

b) 4, 7, 10✓, 13, 16✓, 19, 23✗, 25

2. Fill in the missing number to make this number sentence correct.

$$58 + \boxed{7} = 65$$

Show your work using pictures, words, and numbers

I count by 5's and 3's.
And I use my number chart.✓

The digits are correctly placed in the first sequence and the second sequence has a minor error, as the correct thinking was revealed in the explanation. The explanation addresses the two sequences, stating the first grew by 5 and the second by 3. The student stated s/he used the number chart which might imply the method for determining the correct unknown. 1.NBT.E, 1.NBT.U1-3, MP2, MP3

Student C – Level 3 (Score 5) Page 2

Nina has three number cards.

5

3

8

3. What is the largest two-digit number Nina can make using these cards?
Write that number in the boxes below.

8 2

4. Using these same cards, what two-digit number can Nina make that is closest to 45?

Write that number in the boxes below.

48 49

Show how you figured it out using pictures, words, and numbers.

I think of a largest
number. x

The student was able to accurately put the largest digit in the tens place but then used 2 for the ones place, which was not one of the card options. There could be different explanations for where the two came from. The student merely found two numbers that were close to 45 in part 4. The student did not understand that there needed to be single digits in the boxes. NBT.2, MP2

Level 3 Implications for Instruction

Students who met standard on the task can still improve their performance by being attentive to precession and by making complete explanations. Students need more experiences with explaining. Many of the students who met level 3 failed to correctly find the largest possible number from the three digits. Even more difficult was determining the number closet to 45. This requires student to have quantitative reasoning of two digit numbers.

Therefore, students need more practice with finding lengths on the number line, especially two digit numbers. Student should locate numbers on an open number line, learning to make relative judgements base on benchmark amounts. Students will benefit from engaging in number line math talks and measuring along a number line when working with numbers.

Level 2: Performance below Standard (Score Range 3 - 4)

The student's response shows some of the elements of performance that the tasks demand and some signs of a coherent attack on the core of some of the problems. However, the shortcomings are substantial, and the evidence suggests that the student would not be able to produce high-quality solutions without significant further instruction. The student might ignore or fail to address some of the constraints. The student may occasionally make sense of quantities in relationships in the problem, but their use of quantity is limited or not fully developed. The student response may not state assumptions, definitions, and previously established results. While the student makes an attack on the problem it is incomplete. The student may recognize some patterns or structures, but has trouble generalizing or using them to solve the problem.

Student D – Level 2 (Score 4)

Nina's Numbers

This problem gives you the chance to:

- show you understanding of whole numbers

Nina loves to play the Fill in the Blank games.

1. Write the numbers that belong in each blank.

a) 25, 30[✓], 35, 40, 45[✓], 50

b) 4, 7, 10[✓], 13, 15[×], 19, [×], 25

2. Fill in the missing number to make this number sentence correct.

$$58 + \boxed{7}^{\checkmark} = 65$$

Show your work using pictures, words, and numbers

Handwritten work:

$$\begin{array}{r} 58 \\ + 7 \\ \hline 65 \end{array}$$

The student's explanation is missing. The student does not complete the 5 skip counting sequence correctly and gets only the first missing number in the second sequence. The student does not attempt to find the missing number after 19. But the student does find the correct unknown in part 2. 1.NBT.E, 1.NBT.U1-3, MP2

Student D – Level 2 (Score 4) Page 2

Nina has three number cards.

5

3

8

3. What is the largest two-digit number Nina can make using these cards?
Write that number in the boxes below.

9 9 x

4. Using these same cards, what two-digit number can Nina make that is
closest to 45?

Write that number in the boxes below.

9 8 x

Show how you figured it out using pictures, words, and numbers.

The student was unsuccessful on this second page. S/he did find the largest possible two digit number, but ignored the constraint of picking from three digits. The student did not attempt any explanations. More quantitative reasoning is needed. The student also needs practice in explaining her/his thinking. MP2, MP3

Student E – Level 2 (Score 3)

Nina's Numbers

This problem gives you the chance to:

- show you understanding of whole numbers

Nina loves to play the Fill in the Blank games.

1. Write the numbers that belong in each blank.

a) 25, 30[✓], 35, 40, 45[✓], 50

b) 4, 7, 10[✓], 13, 20[×], 19, 26[×], 25

2. Fill in the missing number to make this number sentence correct.

$$58 + \boxed{5} = 65$$

Show your work using pictures, words, and numbers

The student is able to complete the first sequence correctly. The student finds the first unknown in the growing by three sequence, but as the numbers increase the student makes errors. The student is unsuccessful in determining the unknown in part 2. The student does not provide an explanation. 1.NBT.E

Student E – Level 2 (Score 3) Page 2

Nina has three number cards.

5

3

8

3. What is the largest two-digit number Nina can make using these cards?
Write that number in the boxes below.


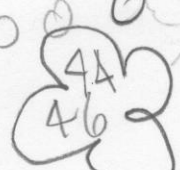
77 72

4. Using these same cards, what two-digit number can Nina make that is closest to 45?

Write that number in the boxes below.

44 46^x

Show how you figured it out using pictures, words, and numbers.

I know beacuse
I cont in my
head.  

The student is unsuccessful on the second page. In part four s/he finds numbers on either side of 45, but ignores the constraints of the problem. The student's explanation does not reveal any thinking. S/he need to learn to explain her/his thinking process.
MP3

Level 2 Implications for Instruction

Students need help in comparing the placement of two digit numbers. The explanations at this level are either incomplete or not focused on mathematical reasoning that makes sense for the situation. The students need learning experiences with number lines and place value to understand quantities.

Students can experiment with these ideas to develop a deeper conception of numbers, so that they may more flexibly reason quantitatively. Instruction should involve more work on defining the relationships on length and the size of numbers. Students need experiences to construct learning for themselves. Students should be asked to explain and justify their answers regularly in class to develop mathematical argumentation. Examining and analyzing other students' explanations is an important experience for students. It provides models and helps students discern important elements of convincing arguments.

Level 1: Demonstrates Minimal Success (Score Range 0 – 2)

The student's response shows few of the elements of performance that the tasks demand. The work shows a minimal attempt on the problem and struggles to make a coherent attack on the problem. Communication is limited and shows minimal reasoning. The student's response rarely uses definitions in their explanations. The student struggles to recognize patterns or the structure of the problem situation.

Student F – Level 1 (Score 2)**Nina's Numbers**

This problem gives you the chance to:

- show you understanding of whole numbers

Nina loves to play the Fill in the Blank games.

1. Write the numbers that belong in each blank.

a) 25, 30✓, 35, 40, 45✓, 50

b) 4, 7, 90^x, 13, 17^x, 19, 23^x, 25

2. Fill in the missing number to make this number sentence correct.

$$58 + \boxed{5} = 65$$

Show your work using pictures, words, and numbers

5

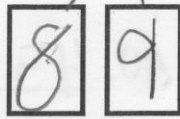
The student was able to demonstrate skip counting by 5, but was unsuccessful with the rest of the task. The student's explanation showed a lack of understanding how to explain his/her thinking. MP3

Student F – Level 1 (Score 2) Page 2

Nina has three number cards.



3. What is the largest two-digit number Nina can make using these cards?
Write that number in the boxes below.



4. Using these same cards, what two-digit number can Nina make that is closest to 45?

Write that number in the boxes below.



Show how you figured it out using pictures, words, and numbers.



The student showed little understanding of the prompt and seems to only use the cards for considering the ten's place. The explanation is negligible. This student needs additional instruction in understanding the task prompts and explaining his/her thinking. MP3

Student G – Level 1 (Score 1)

Nina's Numbers

This problem gives you the chance to:

- show you understanding of whole numbers

Nina loves to play the Fill in the Blank games.

1. Write the numbers that belong in each blank.

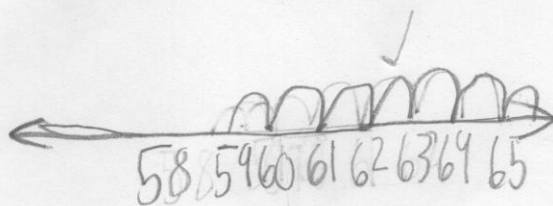
a) 25, 26[✓], 35, 40, 41[✓], 50

b) 4, 7, 8^x, 13, 45^x, 19, 20^x, 25

2. Fill in the missing number to make this number sentence correct.

$$58 + \boxed{6}^x = 65$$

Show your work using pictures, words, and numbers



The student doesn't provide any correct answers in the task, although there are signs of reasoning. The explanation is awarded a point because it shows a counting on strategy that would have worked if the student began with the right starting location. MP3

Student G – Level 1 (Score 1) Page 2

Nina has three number cards.

5

3

8

3. What is the largest two-digit number Nina can make using these cards?
Write that number in the boxes below.

8

3 ✓

4. Using these same cards, what two-digit number can Nina make that is closest to 45?

Write that number in the boxes below.

5

3 ✓

Show how you figured it out using pictures, words, and numbers.

The student made a good attempt at finding the largest number and the number closest to 45. Unfortunately both number were the second closest possibility. The student did illustrate understanding of the tens place. That indicates some quantitative reasoning. MP2, 1.NBT.U.2

The student did not provide an explanation of his/her thinking. MP3

Level 1 Implications for Instruction

Students need support in reasoning quantitatively. They may need to start with number lines and the idea that length on the line equals the size of a number. Students have trouble counting on. Using the number line students can learn quantities. Having students divide the distance between zero and the number to find the location is important. The location of the number on the line is the equal to the number of partitioned segments of length 1.

Students need a deeper understanding of place values. Students need experiences in reasoning about place values, the number of ten bundles plus the number of ones. Students need experiences connecting numbers to their place values and understanding the relative size of numbers.

Students need additional instruction and experiences in writing explanations that explain their process of finding their answers. Sharing models of good explanations are helpful. Having students rewrite and revise explanations is important. The reading of others' explanations and critiquing their reasoning raises the cognitive demand and helps students create better explanations.



GRADE 1 MATH: NINA’S NUMBERS

INSTRUCTIONAL SUPPORTS

The instructional supports on the following pages include a unit outline with formative assessments and suggested learning activities. Teachers may use this unit outline as it is described, integrate parts of it into a currently existing curriculum unit, or use it as a model or checklist for a currently existing unit on a different topic.

INSTRUCTIONAL SUPPORTS.....	29
UNIT OUTLINE.....	30
INITIAL ASSESSMENT: PENCILS AND ERASERS.....	35
FORMATIVE ASSESSMENT: BASE TEN MENU.....	37
FORMATIVE ASSESSMENT: FORWARDS AND BACKWARDS	61

Unit Outline First Grade Math

INTRODUCTION: This unit outline provides an example of how teachers may integrate performance tasks into a unit. *Teachers may (a) use this unit outline as it is described below; (b) integrate parts of it into a currently existing curriculum unit; or (c) use it as a model or checklist for a currently existing unit on a different topic.*

Grade 1 Math: Using Base Ten

UNIT TOPIC AND LENGTH:

- The unit should run between 20 and 25 standard periods of instruction. One of the periods will involve the pre-assessment (0.5 period), introducing and supporting problem solving on the long lesson (2 periods), teaching the formative assessment lesson (2.5 periods) and the final assessment (0.5 period).

COMMON CORE LEARNING STANDARDS:

- **1.NBT.2** Understand that the two digits of a two-digit number represent amount of tens and ones. Understand the following as special cases:
 - **a)** 10 can be thought of as a bundle of ten ones – called a “ten.”
 - **b)** The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
 - **c)** The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).
- **1.NBT.3** Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.
- **1.NBT.4** Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
- **1.OA.1** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
- **1.OA.6** Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$).
- **MP. 1** Make sense of problems and persevere in solving them.
- **MP.2** Reason abstractly and quantitatively.
- **MP.3** Construct viable arguments and critique the reasoning of others.
- **MP.4** Model with mathematics.
- **MP.7** Look for and make use of structure.

<p>BIG IDEAS/ENDURING UNDERSTANDINGS:</p> <p>Students will understand:</p> <ul style="list-style-type: none"> ➤ How to use place value understanding and properties of operations to add and subtract within 10, within 20, within 100. ➤ How to interpret the action of a situation in order to choose an appropriate operation for solving a problem. ➤ Make convincing arguments for why strategies work using knowledge of place value and operations properties. 	<p>ESSENTIAL QUESTIONS:</p> <ul style="list-style-type: none"> ➤ What are the ways to compose and decompose numbers to aid in adding and subtracting numbers with ease? What situation types represent addition and subtraction?
<p>CONTENT:</p> <ul style="list-style-type: none"> • Student will understand the meaning of place value and properties of operations to develop strategies for adding and subtracting. The “benchmarks” of 5 and 10 will serve as useful anchors for helping to ground student thinking about place value. ➤ Students will be able to justify strategies using models and the properties of operations. ➤ Students apply the new knowledge to construct arguments to make connections between representations. ➤ Students demonstrate knowledge through the expert investigation, the performance assessment task in the formative assessment lesson and the final assessment. 	<p>SKILLS:</p> <ul style="list-style-type: none"> ➤ Students match situations involving numbers of objects, addition, and subtraction with number sentences and visual representations. ➤ Students look at problem situations and choose among strategies based on place value and the properties of the numbers. ➤ Students will apply strategies to solve one- and two-step problems and express their ideas using number sentences. ➤ Students write summaries and reflections of what they learned and understood. ➤ Students will represent strategies using number sentences, words and drawings. ➤ Students use understanding of equivalency to compose and decompose numbers using place value and properties of operations.

ASSESSMENT EVIDENCE AND ACTIVITIES:

INITIAL ASSESSMENT :

The unit begins with the performance task ***Pencils and Erasers*** (G1 SVMI 11). The task is designed to measure what students bring to the unit in regard to their knowledge and skill at working with making tens. Please reference ***Pencils and Erasers*** for full details.

FORMATIVE ASSESSMENT:

About 3/4 of the way through the unit, teachers would use the ***formative assessment lesson (FAL)***. The FAL is entitled ***Using Base Ten Menu***. A different pre-assessment task should be administered in class at least two days prior to the two-day lesson. Students should spend no more than 20 minutes on the task. Teachers should review the student work prior to teaching the lesson. The FAL comes with complete teacher notes and the student pages. Please reference ***Using Base Ten Menu*** for full details.

FINAL PERFORMANCE TASK:

The final performance assessment is entitled ***Nina's Numbers*** (SVMI 1 '11). It should be administered during a class period. The task is read to the students. Most students will complete the task in about 10 – 20 minutes, although time should not be a factor. The teacher should provide a reasonable amount of time for all students to finish. The students should be allowed to use any tools or materials they normally use in their classroom. The task can be read to the students and all accommodations delineated in an IEP should be followed. Most performance tasks will include a Spanish version. The task has a specific rubric and a set of benchmark calibration papers. Annotated student work is also included. Please reference ***Nina's Numbers*** for full details.

LEARNING PLAN & ACTIVITIES:

- The unit is designed with a pre-assessment task, an expert task/investigation, a formative assessment lesson and a final assessment. This unit is designed to accompany the curriculum a teacher currently uses to teach the topics listed. The elements in the unit will provide activities to foster formative assessment practices, conceptual understanding and non-routine problem solving.
- The expert investigation is entitled ***Forwards and Backwards***. It contains three separate but mathematically related problems labeled Primary A, Part A, and Part B. All students should start with the Primary A task and then proceed at their own speed to Part A and Part B. It is more important for the student to work deeply on a part and complete a write up than to merely work through and find answers. It is the student's responsibility to be reflective and thorough in their explanations, findings and justifications.
- In addition to the expert investigation, teachers may use the following activities in this unit.

Number Talks – A daily ritual with the entire class for the purposes of developing conceptual understanding of numbers, operations and mathematics. Number talks are used to:

- Review and practice operations, procedures and concepts of numbers.
- Introduce concepts and properties about numbers.
- Reinforce procedures and number concepts.
- Explore the connections between numbers.

Do a number talk every day but for only 10 minutes. A few minutes more often is better than a lot of minutes infrequently.

1. Ask questions such as:
 - How did you think about that?
 - How did you figure it out?
 - What did you do next?
 - Why did you do that? Tell me more.
 - Who would like to share their thinking?
 - Did someone solve it a different way?
 - Who else used this strategy to solve the problem?
 - What strategies do you see being used?
 - Which strategies seem to be efficient, quick, and simple?
2. Give yourself time to learn how to:
 - Record student solutions
 - Listen to and observe students
 - Collect notes about student strategies and understanding
3. Name/label the strategies that emerge from your students:
 - Use doubles
 - Break apart numbers
 - Make it simpler
 - Use landmark numbers (25, 50, 75, 200, etc)
 - Use a model to help
 - Use what you already know
 - Make a “10”
 - Start with the 10’s
 - Think about multiples
 - Think about money
 - Traditional algorithm
 - Counting on
4. Create a safe environment. When students feel safe, they are comfortable sharing answers even when it’s different from everyone else’s.
5. Give opportunities for students to “think first.”
6. Encourage self-correction; it’s okay to change your mind, analyze your mistake, and try again.
7. Give number talks time to become part of your classroom culture. Expect them to follow the usual learning curve stages. “Keep on keeping on” and you will get positive results.

Think/Write/Pair/Share is a high leverage strategy that respects individual time to process and organize ideas before engaging in peer-to-peer discussions. This process can be used throughout the unit as a vehicle for students to self reflect, construct new meaning by building on the ideas of others, and strengthen their arguments.

Journal Entries for Reflection: Using prompts such as, “How has my thinking changed?” or “How

can I explain better?" can provide valuable opportunities for students to tweak their own solutions during class or for homework, and subsequently, deepen their understanding of content.

Working on the rug: This strategy helps students to focus, consider having students “circle up” on the floor. Other important strategies include:

- Create a safe environment. When children feel safe, they are comfortable sharing answers even when it’s different from everyone else’s.
- Provide concrete models (snap cube “trains”, base 10 blocks, money, etc.)
- Give opportunities for children to “think first” and then check with the models.
- Have students occasionally record their thinking and the steps they use to solve a problem.
- Encourage self-correction; it’s okay to change your mind, analyze your mistake, a try again.
- Provide number stories to reinforce a context and purposes for number operations.
- Be curious; avoid making assumptions.
- Expect students to break apart numbers. Use strategies such as making tens, or use of ten-frames. Show them steps of how to add: $6+8$ (think of 6 as $4+2$; add the 2 to 8 to get 10 and just add the remaining 4 to get 14).
- Show the strategy you used. Make sure they know it’s not “the” way, just another strategy.
- Give students larger numbers so they can give “estimates.”

RESOURCES:

- Normal materials used in math class include manipulatives such as cards for matching activity, square tiles, counters, and ten frames, etc.
- All the materials referenced in the assessments, formative assessment lesson and expert investigation are included.

Mathematics



GRADE 1 MATH: NINA'S NUMBERS INITIAL TASK: PENCILS AND ERASERS



Pencils and Erasers

There are 10 things on a desk. Some of them are pencils and some are erasers. Remember there are 10 in all. How many of each could be on the desk?

Show how you figured out your answer using pictures, numbers and words.

Can you find a different way to show 10 pencils and erasers on a desk?



GRADE 1 MATH: NINA'S NUMBERS

FORMATIVE ASSESSMENT LESSON: BASE TEN MENU

Base Ten Menu

Mathematics Assessment Project

BAM/MARS

**Silicon Valley Mathematics Initiative- University of
Nottingham
2011**

Formative Assessment Lesson

Mathematical goals

This lesson unit is intended to help you assess how well students are able to compose and decompose numbers within 20. Students should develop a range of strategies and be able to explain why the strategies work. The number ten is emphasized as it is key to understanding our number system. In particular, this unit aims to identify and help students who have difficulties with:

- Thinking of ten in two ways: as one ten and as ten ones
- Composing and decomposing numbers in a variety of ways and discovering how to use this information when adding and subtracting
- Developing strategies for determining sums and differences when adding and subtracting one- and two-digit numbers
- Describing and explaining solutions clearly and effectively

Standards addressed

This lesson relates to the following Common Core State Standards:

First Grade Number and Operations in Base Ten: Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand that the numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight or nine ones.

First Grade Number and Operations in Base Ten: Add within 100 using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

First Grade Number and Operations and Algebraic Thinking: Add and subtract within 20, demonstrating fluency for addition and subtraction within 10.

First Grade Number and Operations and Algebraic Thinking: Understand the meaning of the equal sign.

This lesson relates to the Mathematical Practices:

- Modeling: Mathematically proficient students can apply the mathematics they know to solve problems. This might mean at early grades being able to write an equation or problem to demonstrate a situation.
- Constructing Viable Arguments and Critiquing the Reasoning of Others: At the early grades, this might mean that students can compare their results with others. They might find ways to order and/or generalize about solutions. Others may find more than one solution path to a given problem.

Introduction

This lesson unit is structured in the following way:

- Students work on their own to complete an assessment task, *Maria's Piggy Bank*, designed to reveal their current understanding and difficulties.
- Students are introduced to a series of "warm-up" or quick activities that may be continued throughout the year.
- Students work on a series of Menu activities, some are individual activities and some involve partner work. These activities may be set up in a menu format, taught as whole class lessons or both. They may continue throughout the year.
- Students return to their work on the assessment task and try to improve their own responses.

Materials required

Each student will need one copy of the assessment task, *Maria's Piggy Bank*.

Each pair of learners will need the following:

- Manipulatives used regularly in math class to facilitate number, operations and place values such as: paper and pencil, mini-white boards, 100s and/or 0-99 charts, ten frames (blank, filled in, and sets of playing cards), decks of number cards, dice, counters, cubes, etc.

Resources

Books

Carpenter, Thomas P., Fennema, Elizabeth, Franke, Megan Loef, Levi, Linda and Empson, Susan B., 1999. **Children's Mathematics: Cognitively Guided Instruction** Portsmouth, New Hampshire: Heinemann

Carpenter, Thomas P., Franke, Megan Loef, and Levi, Linda 2003. **Thinking Mathematically: Integrating Arithmetic & Algebra in Elementary School** Portsmouth, New Hampshire: Heinemann

Corwin, Rebecca B. 1996. **Talking Mathematics: Supporting Children's Voices** Portsmouth, New Hampshire: Heinemann

Fosnot, Catherine Twomey and Dolk, Maarten 2001. **Young Mathematicians at Work: Constructing Number Sense, Addition, and Subtraction** Portsmouth, New Hampshire: Heinemann

Heibert, James et.al., 1997. **Making Sense** Portsmouth, New Hampshire: Heinemann

Richardson, Kathy 2002. **Assessing Math Concepts: Hiding Assessment** Bellingham, Washington: Mathematical Perspectives

Richardson, Kathy 1997. **Math Time, The Learning Environment**, Norman, Oklahoma: Educational Enrichment, Inc.

Richardson, Kathy 1999. **Developing Number Concepts: Addition and Subtraction**, White Plains, New York: Pearson Education, Inc.

Richardson, Kathy 1999. **Developing Number Concepts: Place Value, Multiplication and Division**, White Plains, New York: Pearson Education, Inc.

Van de Walle, John A. 2004. **Elementary and Middle School Mathematics: Teaching Developmentally** Boston, MA: Pearson Education, Inc.

Van de Walle, John A. 2006. **Teaching Student Centered Mathematics: Grades K-3** Boston, MA: Pearson Education, Inc.

Videos

"How to Teach Math as a Social Activity" Edutopia.org-video on building community norms around math discussions.

Video episodes throughout this resource show students formulating conjectures around properties of numbers and operations: Carpenter, Thomas P., Franke, Megan Loef, and Levi, Linda 2003 **Thinking Mathematically: Integrating Arithmetic & Algebra in Elementary School** Portsmouth, New Hampshire: Heinemann

Time needed

The lesson will need one 20-25 minute pre-assessment session, at least four - seven 25-40 minute sessions (composed of a 10-15 minute warm-up activity and a 25-30 minute menu session) and a 15-20 minute student editing session to revise initial pre-assessment. Timings given are only approximate. Exact timings will depend on the needs of the class.

Before the lesson

Individual Assessment Task:

The assessment task, *Maria's Piggy Bank*, should be completed before the lesson. If needed, the task may be read to students. Ask students to attempt the task on their own. Explain that they should not worry too much if they cannot understand or do everything, because you plan to have other opportunities which should help them.

It is important that students are allowed to answer the questions without assistance, as far as possible. If students are struggling to get started then ask questions that help them understand what is required, but don't do it for them. For example,

“What is this problem asking us to find out?”

“What do you know?”

Assessing students' responses

Collect a sample of students' responses to the task and make some notes on what their work reveals about their current levels of understanding. The purpose of doing this is to forewarn you of the difficulties students may experience during the formative assessment lesson itself and so that you may prepare carefully. Do not grade students' work at this stage. Research shows that this will be counterproductive, as it will encourage students to compare their grades and distract their attention from the mathematics. Instead, try to understand their reasoning and think of ways in which you can help them. Wait to grade this task until it is revised by students at the end of this lesson.

Suggested lesson outline

Since every first grade classroom is unique, teachers should feel free to organize the following activities in ways that make the most sense for their students. For example, the warm-ups could come at the beginning of the main lesson or they might be introduced throughout the day when there are an “extra few minutes”. Likewise, some classes might be ready to handle several menu choices and others might need to stick with a whole class model. Hopefully, many of these activities will become an ongoing part of the year's curriculum. Giving students enough time with activities will provide evidence of their application of concepts (Richardson, **Math Time**, p. 119).

Warm-Ups

A warm-up activity should be a short time (5-10 minutes) to look at mathematical ideas together. Introduce new warm-up ideas gradually. As students do each warm-up activity repeatedly, they gain experience analyzing what is happening and strengthening their ability to justify their solutions. These warm-up activities are designed to be used with an overhead projector, a Smartboard or white board. If one of these is not available, you can present the problem(s) on a large sheet of paper.

Warm-up Activities

Quick Look With Ten-Frames

Students will be given a “quick look” (2 seconds) at a ten-frame and respond by holding up their fingers to match the number shown. The teacher presents the ten-frames on flash cards large enough for the class to view (these may be enlarged from those in Appendix 2, or used on an overhead projector). Students should be encouraged to justify their answers.

Extensions:

As students become more fluent with their responses they can be asked to show how many are needed to make ten.

Hold up a full ten-frame and a second ten-frame and have students record the correct number on individual white boards.

This activity gives the opportunity for students to:

Think of ten in two ways – as one ten and as ten ones.

Compose and decompose numbers in a variety of ways and discover how to use this information when adding and subtracting.

Develop strategies for determining sums and differences when adding and subtracting one and two-digit numbers.

Describe and explain solutions clearly and effectively.

Roll The Dice

The teacher rolls a large die, or a regular die can be rolled and viewed by students using a document camera, and students respond by showing how many they see with their fingers. This warm-up helps students to practice subitizing, or instant recognition of small numbers. Students should be encouraged to justify their answers.

Extensions:

Roll two dice and have students record their responses on individual white boards.

The number of dice can be increased for students who have mastered beginning math facts and are ready to practice three addends.

Play Dice Roll as a partner game and students say the number rolled rather than holding up fingers.

This activity gives the opportunity for students to:

Think of ten in two ways – as one ten and as ten ones

Compose and decompose numbers in a variety of ways and discover how to use this information when adding and subtracting.

Develop strategies for determining sums and differences when adding and subtracting one and two-digit numbers.

Describe and explain solutions clearly and effectively.

Rename That Number

The teacher selects a target number and students are asked to record that number in as many ways as possible on a mini-whiteboard. Students hold up their boards at the end of the activity for the whole group to view. Students share their partner's responses and then individuals may be called on to share with the whole group.

Example:

27

(is written by the teacher)

Possible ideas seen on student white boards:

2 tens and 7 ones

1 ten and 17 ones

$30 - 3$
 $20 + 4$
And so on...

This warm-up helps student to understand that there are many and varied ways to represent numbers.

This activity gives the opportunity for students to:

Think of ten in two ways – as one ten and as ten ones

Compose and decompose numbers in a variety of ways and discover how to use this information when adding and subtracting.

Develop strategies for determining sums and differences when adding and subtracting one and two-digit numbers.

Describe and explain solutions clearly and effectively.

What Is My Shortest Name?

The teacher asks students to record the “shorter name” for the number clues given. For example:

“I have one ten and three ones.” (13)

“I have one ten and four plus four ones.” (18)

“I have one ten and no ones.” (10)

“I have two tens and six ones.” (26)

“I have nine ones and three tens.” (39)

I have twelve ones and one ten. (22)

“I have seventeen ones and three tens.” (47)

This activity gives the opportunity for students to:

Think of ten in two ways – as one ten and as ten ones

Compose and decompose numbers in a variety of ways and discover how to use this information when adding and subtracting.

Develop strategies for determining sums and differences when adding and subtracting one and two-digit numbers.

Describe and explain solutions clearly and effectively.

Menu

The following menu activities are designed to be introduced during a directed instructional time but done by students independently in pairs or pair partners. Provide multiple opportunities for students to practice these planned and focused activities. After students fully understand how to do a task they will be ready to benefit from the experience. At that point, children deepen their conceptual understanding of the activity and teachers have the opportunity to observe and listen to student thinking. Important formative assessment information can be garnered at this time.

As stated earlier, each classroom is unique and the implementation of these menu activities may vary. What is important is that students learn the routine of the activity and have multiple opportunities to practice each experience in order to internalize the concepts and build confidence, accuracy, and consistency.

Menu Activities

How Many Are Hiding?

This partner game gives students practice in composing and decomposing numbers within ten. It can be played using any small counting objects (chips, small stones, etc.) and a cup to hide some of the objects. This deep work with small numbers is “key” to effective counting methods, to place value, and to addition and subtraction strategies.

If possible, the teacher should individually assess children before playing the game. Start with three or four objects and ask the student to verify how many are on the table. Ask the student to close their eyes and then the teacher hides some of the counters under the cup. The student should be able to quickly and confidently identify how many objects are hiding by viewing the number showing. If the student shows mastery of this number (e.g. can identify all of the possible combinations without counting) increase the number by one until the student reaches the number where they need additional practice.

Students may be partnered with someone working on the same number. Students take turns hiding counters and identifying how many are missing. Students are encouraged to justify their answers.

Extensions:

Students may be asked to fill in a recording sheet that indicates how many counters can be seen and how many are hiding. (Appendix 2)

Students may be asked to check in with the teacher when they feel they are ready to move on to a larger number.

This activity gives the opportunity for students to:

Compose and decompose numbers in a variety of ways and discover how to use this information when adding and subtracting.

Describe and explain solutions clearly and effectively.

Which Is Greater (Which Is Less)?

This is a partner card game played with a deck of ten-frame playing cards. It gives students practice in recognizing ten-frames and developing fluency in combining numbers within twenty.

The game is played as follows:

Divide the cards into two stacks, face down.

Players determine if they are looking for the card that is greater or the card that is less (this may be decided by the teacher).

Players each turn over one card from the stack at the same time.

The player with the larger (smaller) number says, “___ is greater (less) than ___.”

Players may keep their own cards or the player with the “winning card” may collect both.

Play continues until all of the cards have been turned over.

Students are encouraged to justify their greater (lesser) number.

Extensions:

Players turn over two cards at a time and compare the sums.

Play with a deck of numeral dot cards or number cards.

This activity gives the opportunity for students to:

Think of ten in two ways – as one ten and as ten ones

Compose and decompose numbers in a variety of ways and discover how to use this information when adding and subtracting.

Develop strategies for determining sums and differences when adding and subtracting one and two-digit numbers.

Describe and explain solutions clearly and effectively.

Find Tens

Using a deck of dot numeral cards (4 each of 1-9 cards) students turn over nine cards and display them in a 3x3 grid. The first player selects all the pairs of cards that total ten and collects those cards. The missing cards are replaced from the deck and the second player finds all the pairs of two cards that total ten. Those missing cards are replaced, and play continues until combinations of ten can no longer be made. Students are encouraged to justify their selections. Students record their pairs of numbers that equal 10.

Variation:

Students may find totals of 10 using 2 or more cards.

This activity gives the opportunity for students to:

Compose and decompose numbers in a variety of ways and discover how to use this information when adding and subtracting.

Develop strategies for determining sums and differences when adding and subtracting one and two-digit numbers.

Describe and explain solutions clearly and effectively.

How Many More?

Materials:

How Many More game board (Appendix 2)

Game markers (different kind for each pair)

cards (4 each of cards 1-6) (Appendix 2)

paper for recording equations

This activity is played by two pairs of partners. Using the How Many More game board, the first pair pulls a card to determine how many more are needed to make 10. The pair places a marker on a dot pattern that represents the missing amount. Example: If a 2 is drawn from the cards, 8 is needed to make 10. The pair then places one of their markers on one of the 8 patterns on the game board. Pairs are required to say the math fact aloud for each turn. In this case, the pair might say, $2 + 8 = 10$ or $10 - 2 = 8$.

The partner pairs alternate turns following this procedure. The first pair to place three of their markers in a row horizontally, vertically, or diagonally wins.

Extension:

The game board can remain the same but students would use cards 5- 10 in order to find How Many More to make 14.

This activity gives the opportunity for students to:

Think of ten in two ways – as one ten and as ten ones

Compose and decompose numbers in a variety of ways and discover how to use this information when adding and subtracting.
Develop strategies for determining sums and differences when adding and subtracting one and two-digit numbers.
Describe and explain solutions clearly and effectively.

Individual post-assessment work (15-20 minutes)

Finally, reissue the Assessment task, ***Maria's Piggy Bank***, and ask student to have another go at it. It is helpful if this is done in a different color, so that you can see what they have learned. This will help you monitor what has been gained from the lesson.



Maria's Piggy Bank

1. Maria's piggy bank fell off her desk and broke! There are pennies, nickels and dimes everywhere. Maria needs 25 cents to buy ice cream. What coins could she use to pay the 25 cents? Show your answer using pictures, numbers and words.

2. Show a different combination of coins that Maria could use.

3. Are there other ways to make 25 cents? _____
Show the other ways that you can make 25 cents.

Mathematics Assessment Collaborative

PERFORMANCE ASSESSMENT SCORING GUIDE GRADE 1

	Maria's Piggy Bank Grade 1:	Points	Section Points
	<p>The core elements of the performance required by this task are:</p> <ul style="list-style-type: none"> • Use operations to solve problems • Understand and apply properties of numbers • Compose and decompose numbers in flexible ways <p>Based on these credit for specific aspects of performance should be assigned as follows</p>		
1	<p>Shows a combination of coins to make a total of 25 cents</p> <p>25 pennies or 5 nickels 2 dimes and one nickel 2 dimes and five pennies 1 dime and 3 nickels 1 dimes, one nickel and 10 pennies etc.</p>	3	3
2	<p>Shows an alternate correct solution for a total of 25 cents</p> <p>25 pennies or 5 nickels 2 dimes and one nickel 2 dimes and five pennies 1 dime and 3 nickels 1 dimes, one nickel and 10 pennies etc.</p>	3	3
3	<p>Yes</p> <p>Shows 3 or more additional ways Shows 2 additional ways Shows one additional way</p>	1 3 (2) (1)	4
	Total Points		10

Sharing Strategies and Solution Paths Around Number, Operations and Place Value

The focus of this formative assessment lesson is to have students deepen their conceptual understanding of our base-ten number system and to use this understanding to add and subtract accurately and efficiently. In order for children to learn, understand, and remember, they need time interacting with ideas, thinking about where these ideas fit in relation to what they already know, uncovering the logic, and then applying it to their thinking around these ideas. Explaining their reasoning helps to solidify and extend their understanding.

As such, correct and incorrect ideas should be accepted during the discussion of strategies and solution paths. Students and teachers need to respectfully accept correct and incorrect responses during mathematical discussions. It is important to establish a classroom atmosphere where students feel safe to share their ideas. Students should be guided to understand that learning can occur even when a response is incorrect. Questions are posed by the teacher and by students that will move all towards the underlying mathematics that determines the correctness of answers.

When learners are first introduced to sharing their strategies and solution paths, it is important to explain the purpose and to describe how they should work during these discussion times. The emphasis is on understanding. We need to think and talk about problems to solidify our learning. In order for all to benefit from these sharing of ideas, we need to remember these things:

- We share ideas and listen to others.
- We ask “why does this work” until we understand.
- We respect one another’s opinions.
- We know that we learn from mistakes as well as from correct answers.
- Our goal is for the students, the teacher and the mathematics to agree in the end.

The table that follows includes some common issues confronted when students begin sharing their thinking around place value, number and operations. The suggested questions and prompts are a beginning list that will grow as you work with students to understand and make sense of the mathematics. As you start the sharing of ideas, do so by asking one or two types of questions. This gradual implementation is important for students as well as for their teachers.

Common Issues	Suggested Questions and Prompts
Warm-up Activities	
Quick Look With Ten-Frames and Roll That Dice	
Students are unable to respond after seeing the ten-frame for a short time.	<p>When this activity is first introduced it may be necessary to give students a “second look” and allow them to view the card for a longer period of time. Give students enough time so that individuals do not “shutdown” and feel that they do not have access to the problem.</p> <p><i>MP7 Look for and make use of structure.</i></p>
Students shown two ten-frames know the names but may be unable to think of the total number of dots as tens and extras.	<p>Use the base ten language (i.e. one ten and four ones) showing the base ten model and also the standard language (fourteen). Emphasize that the teens sound “backwards” and do not fit the patterns of larger counting numbers.</p> <p><i>MP4 Model with mathematics.</i></p> <p><i>MP 7 Look for and make use of structure.</i></p>
<p>Students hold up varied answers on their white boards to totals of two ten-frames.</p> <p>Students hold up different numbers of fingers after seeing the dice roll.</p>	<p>The teacher may say: “will someone share how they are thinking about their answer?” or “will someone share with us how you found the total number of dots?”</p> <p>The teacher may say, “I see 3, 4, 5 and 6 fingers. Could all of those answers be correct?” Then ask different students, “tell us how you saw the number.”</p> <p><i>MP3 Construct viable arguments.</i></p>
When asked to explain their thinking, a student might say something like, “I just thought of it.”	<p>The teacher may say to that student or to another, “can you show us why that answer makes sense?” or, “would you use this picture of ten-frames (or a drawing or objects) to show us why your answer makes sense?”</p> <p><i>MP3 Construct viable arguments and critique the reasoning of others.</i></p>
Rename That Number and What Is My Shortest Name?	
<p>Students have a limited number or no responses.</p> <p>Only a few of the students in the class are sharing their solutions and justifications</p>	<p>Allow quiet think time and then suggest: “turn to one other person and share your answer and how you thought about it.” Then prompt: “let’s list some of the answers you heard”. Then ask, “let’s share how these answers make sense.”</p> <p>Ask, “who thought of it in a similar way?” “Who thought of it in a different way?” or “Does anyone have the same answer but a different way to explain it?”</p> <p><i>MP3 Construct viable arguments and critique the reasoning of others.</i></p>
Answer error	It is important to ask these questions frequently and not just for answers in error:

	<p>“Do you agree or disagree with this?” “Why?”</p> <p>“What might a model or drawing for that look like?”</p> <p>“Can someone make a model or drawing for that?”</p> <p><i>MP3 Construct viable arguments and critique the reasoning of others.</i></p> <p><i>MP4 Model with mathematics.</i></p>
Menu Activities	
How Many Are Hiding?	
No response from student when asked how many are hiding, or, the student makes an unreasonable response to the number hiding.	<p>The number is too big and the child cannot visualize how many are hiding. Try using the next smaller amount of counters.</p> <p><i>MP4 Model with mathematics.</i></p> <p><i>MP 7 Look for and make use of structure.</i></p>
The response is close but not correct, or, the student thinks long about what’s hiding and figures out the correct answer by counting each object.	<p>Shows some understanding of the parts of the number but needs more practice with that number of counters.</p> <p><i>MP4 Model with mathematics.</i></p> <p><i>MP 7 Look for and make use of structure.</i></p>
The student responds quickly and accurately.	<p>The parts of the whole have been internalized and student is ready to work on the next larger amount of counters.</p> <p><i>MP4 Model with mathematics.</i></p> <p><i>MP 7 Look for and make use of structure.</i></p>
Which Is Greater? (Which Is Less?)/ Find Tens/How Many More?	
When using ten-frames a student does not easily recognize the amount of dots.	Students may be more successful using the referent of 5 before they can internalize the 10 in the ten-frame.
The pair, or pairs of partners, has trouble getting started.	<p>“What do you need to find out?”</p> <p>“What do you already know?”</p> <p>“How might you begin?”</p> <p><i>MP4 Model with mathematics.</i></p> <p><i>MP 7 Look for and make use of structure.</i></p>
The student names the correct answer but does not justify the answer.	<p>“Tell us how you thought about that answer. Can you use these counters to prove your answer?”</p> <p>“Do you think your answer is reasonable?”</p> <p>Or</p> <p>Ask the partner to respond, “do you agree/disagree with ____’s answer? Can you explain why you agree/disagree with that answer?”</p> <p>“Can you convince me that the answer makes sense?”</p> <p><i>MP3 Construct viable arguments and critique the reasoning of others.</i></p> <p><i>MP4 Model with mathematics.</i></p> <p><i>MP 7 Look for and make use of structure.</i></p>
The student names an incorrect answer.	<p>“Tell us how you thought about that answer. Can you use these counters to prove your answer?”</p> <p>Or</p> <p>Ask the partner to respond, “do you agree/disagree with ____’s answer? Can you explain why you agree/disagree with that answer?” “Can you convince me that the answer makes sense?”</p> <p><i>MP3 Construct viable arguments and critique the</i></p>

	<i>reasoning of others.</i> <i>MP4 Model with mathematics.</i> <i>MP 7 Look for and make use of structure.</i>
The teacher wants to know more about what the student is thinking about the activity in general.	“What strategy are you using to solve this?” “What patterns do you see?” “What relationships between the numbers do you see?” “Why did you...?” <i>MP3 Construct viable arguments.</i> <i>MP 7 Look for and make use of structure.</i>

Appendix 2

●	●	●	●
●	●	●	●
●	●	●	●
	●	●	●
	●	●	●

Ten frames

●	●	●	●
●	●	●	●
	●	●	●
	●	●	●
	●		●

	●	●	●
	●		●
	●		●
	●		●
			●

	●	●	●
	●		●
	●		●
			●
			●

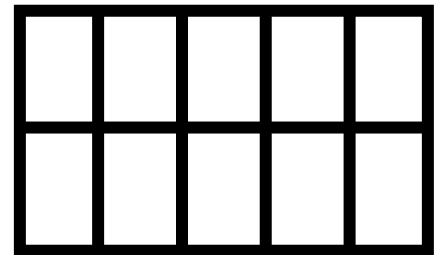
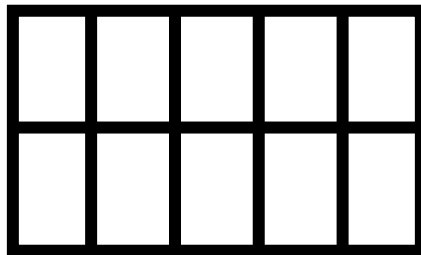
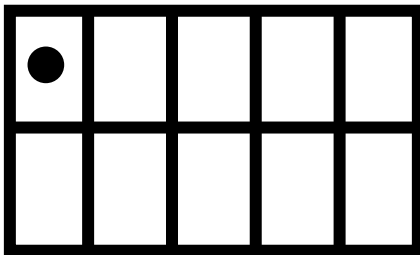
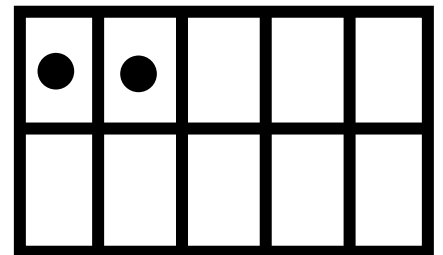
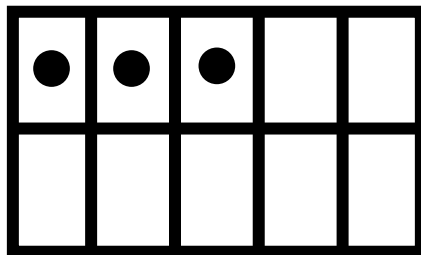
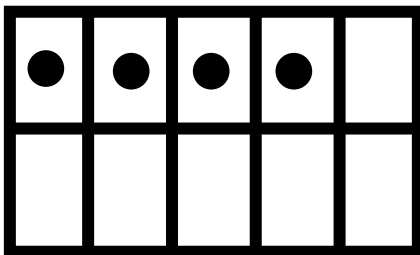
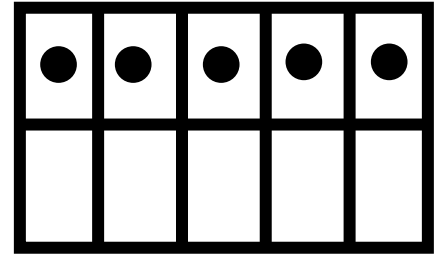
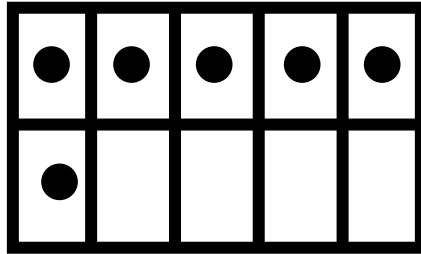
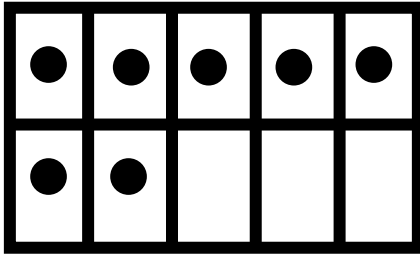
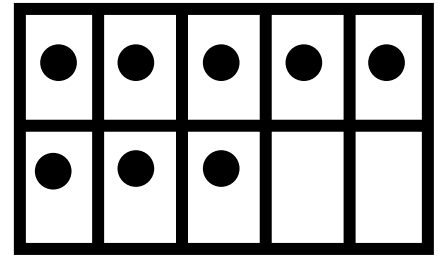
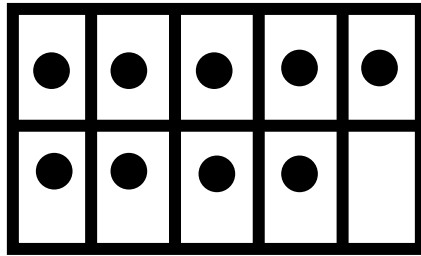
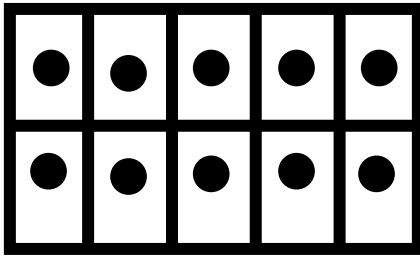
Ten frame

	●
	●

Ten frame

	●

Ten Frames



Numeral Dot Cards

1	2	3	4	5
6	7	8	9	10

How Many Are Hiding?

Game 1

Number in all _____

Hiding	Out

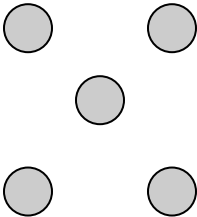
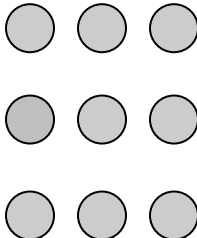
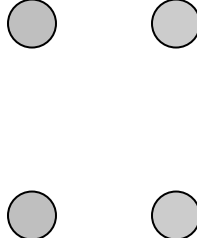
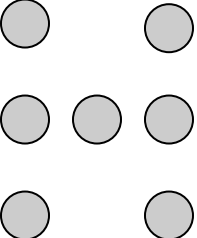
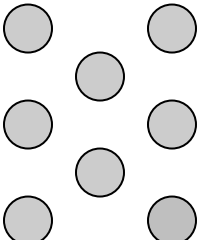
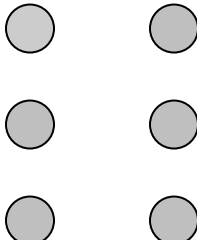
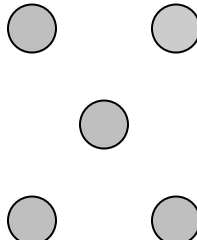
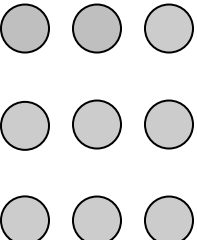
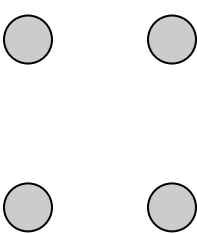
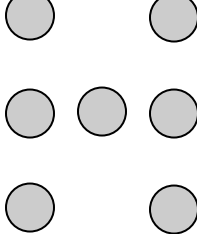
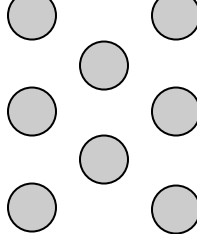
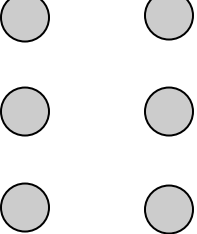
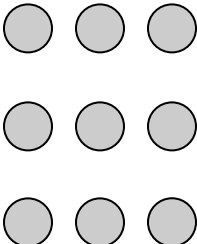
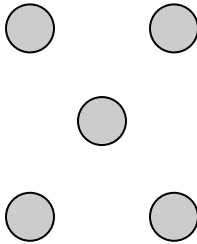
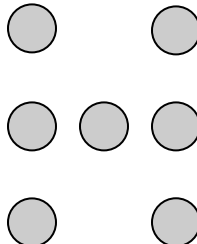
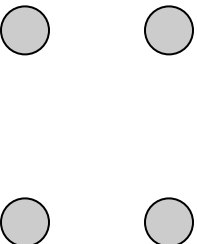
How Many Are Hiding?

Game 2

Number in all _____

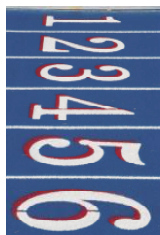
Hiding	Out

How Many More?



GRADE 1 MATH: NINA'S NUMBERS INVESTIGATION: FORWARDS AND BACKWARDS



Investigation

Forwards and Backwards



Level A

Materials: A set of block or counters for each pair, pencil and paper.

Discussion on the rug: Teacher shows the pattern blocks. "How can we add to 4? Who can tell me a number sentence that adds up to 4?" Teacher asks a student and records the students' number sentences. "Who knows a different way to add to 4?" Teacher continues to ask children to find different number sentences. "Have we found every way? How will we know when we are done?" Students share their thoughts.

In small groups: Each group has a set of blocks or counters. "How many ways can you add to get an total of 8? Show me all your number sentences."

At the end of the investigation have students write all their numbers sentences. Have them answer the following questions:

"How did you find all the ways to add to 8?"

"Do you think you found every way?"

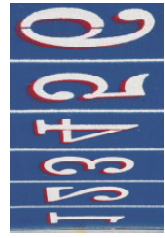
"How many ways are there?"

"Why do you think you know you found them all?"



Investigation

Forwards and Backwards



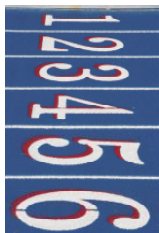
Level B

Find and list all the ways you can add two counting numbers to equal 12. The order that numbers are added doesn't matter in whether two number sentences are the same.

What patterns do you see in the number sentences?

How do you know you have found all possible number sentences? Explain.

Find and list all the ways you can add three counting numbers to equal 12.



Investigation

Forwards and Backwards



Level C

Pick any 2-digit number where not all the digits are equal. Order the digits from highest to lowest to create the largest number. Next order the digits from lowest to highest to create the smallest number. Find the positive difference between the two numbers. Investigate different solutions you find. Are there patterns? If so, what patterns did you find.



GRADE **1** MATH: NINA'S NUMBERS

SUPPORTS FOR ENGLISH LANGUAGE LEARNERS

GRADE 1 MATH: NINA’S NUMBERS

Supports for ELLs

Title: Nina’s Numbers	Grade: 1
<p>Linguistic Access:</p> <p>In these supportive materials, a distinction between the vocabulary and the language functions is needed to provide entry points to the math content. Both need to be clarified to ensure comprehension and to avoid misunderstanding. This can be done by introducing and/or reviewing the most essential vocabulary and language functions in context and with concrete models, when applicable, in order for English Language Learners (ELLs) to better understand the meaning of the terms. The following vocabulary/language functions are suggested:</p> <p><u>Vocabulary Words/Phrases:</u></p> <p>Tier I (non-academic language): piggy bank, cards, deck, die/dice, blank, missing amount, marker, figure, digit</p> <p>Tier II (general academic language): penny, nickel, dime, pattern, largest, smallest, least, greatest</p> <p>Tier III (math technical language and concepts that must be carefully developed): ten-frame, digit, two-digit number, pattern, figure, making ten</p> <p><u>Notes:</u></p> <p>Words like “largest,” “smallest,” “least,” and “greatest” should be used to compare quantities; words like “highest” and “lowest” should be used to signify position, not quantity. To avoid confusion, be consistent when using such words.</p> <p>Explain to students what a homonym is (one of two or more words spelled and pronounced alike but different in meaning) and provide examples, such as “figure,” “deck,” “digit” and “board.”</p> <p><u>Language Functions:</u> convince (“Can you convince me ...?”), find, list, show, positive difference, investigate</p>	
<p>Content Access:</p> <p>To provide content access to ELLs, it is important that they are familiar with the concept of creating diagrams to illustrate a situation or a pattern. Students should be familiar with how to organize information, especially when they are asked, “How do you know you have found all possible number sentences?”</p>	

Also, in order to successfully engage pupils in the activities that are proposed as part of the instruction, it is important that ELLs understand the concept of “making ten” (or “make ten”) as it is used in the context of place value. It should be made explicit to ELLs that “making ten” signifies making one set of ten from ten sets of one. The understanding of place value is crucial if one is truly to understand number. Therefore, concrete models are absolutely necessary for ELLs as well as for students who are tactile-kinesthetic learners. Materials that are measurement models, such as base 10 blocks or bundling activities, are essential if one is to move from the concrete to the abstract while constructing a strong foundation.

Introducing basic mathematics principles, such as the commutative principle for addition, is important, especially after sufficient activities have been presented. When this has been accomplished, select vocabulary that is clear to ELLs. For example, state: “When adding, if you change the order of the numbers, the total is still the same.” Be sure to include examples, such as $5 + 3 = 8$ and $3 + 5 = 8$ (see page 63, Level B).

Scaffolds and Resources:

- Organize tasks to maximize opportunities for ELLs to engage in math discourse. It is recommended that:
 - Teacher allows students to work collaboratively in pairs or triads and to justify their decisions to peers.
 - Teacher supports ELLs use of language resources, including their native language, cognates, gestures, drawings, etc. to convey their understandings.
 - Teacher models not only math content but also the desired academic language in context to develop students’ academic discourse.
 - Teacher uses dot cards (faces of a die) and matches picture, numeral, and number word. Represent the numbers 7, 8, and 9 using the cards pictured on the “How Many More?” activity game board (see page 60). Once this is understood, use these same pictures for other activities to reinforce the concept of number. Utilize the dot cards (with the same arrangements) as a memory trigger instead of introducing different configurations (see page 58), which may confuse rather than help ELLs.
 - Teacher uses physical objects to facilitate students’ accountable talk and conceptual knowledge (e.g., manipulatives such as base 10 blocks, unifix cubes, bean sticks, abacus, and bundling materials).
 - Teacher gives appropriate wait time for ELLs for respond.
 - Teacher uses grade-appropriate language and avoids using possibly confusing phrases like “positive differences.”
- Use menu activities for related applications once students are familiar with the activity and corresponding materials. On page 45, for example, the menu activity “How Many Are Hiding?” presents some instructional opportunities that teachers can use to expand ELLs’ knowledge once students have had the opportunity to compose and decompose number. Build on ELLs’

understanding and adapt the activity to find the “missing addend,” a difficult concept for first-graders.



GRADE **1** MATH: NINA'S NUMBERS

SUPPORTS FOR STUDENTS WITH DISABILITIES

Grade 1 MATH: NINA’S NUMBERS

Instructional Supports for Students with Disabilities Using UDL Guidelines

Background Information

- ***Provide options for language, mathematical expressions, and symbols – clarify vocabulary and symbols.***
- ***Provide options for comprehension – activate and supply background knowledge.***

Learners differ in the ways that they perceive and comprehend linguistic and non-linguistic representation. The manner in which vocabulary, mathematical expressions and symbols are communicated should be varied so that students experience multiple entry points to comprehend and learn concepts. It is important to ensure that alternative representations are provided not only for accessibility, but for clarity and comprehensibility across all learners.

Proper design and presentation of information – the responsibility of any curriculum or instructional methodology - can provide the scaffolds necessary to ensure that all learners have access to knowledge. It is in this way that all students will be able to learn to generalize their mathematical understanding for real world application.

Students’ ability to make sense of problems and persevere in solving them is targeted in Nina’s Numbers. Throughout the task, students will be required to use operations to solve problems, understand and apply properties of numbers, and compose and decompose numbers in flexible ways. They will also need to explain their thinking.

It is critical to guide students in making mathematical connections and involve them in their learning. Learning can be supported by integrating math with literacy, technology and art. Using visuals, manipulatives and software will support students’ capabilities to understand the various concepts necessary to solve tasks associated with Nina’s Numbers.

The strategies and the instructional supports provided below are intended to anchor students’ mathematical learning and thinking. They are designed to provide insight as to how you can use UDL guidelines to solve the Nina’s Numbers Performance Task and other instructional tasks in the unit. Please note that there are countless ways in which to use UDL guidelines and many other activities that can be created to support students in having access to and learning the mathematical concepts outlined in this unit. Students need multiple exposures and opportunities to practice the underlying mathematical concepts and language presented in Nina’s Numbers. The activities outlined throughout

this document, will focus on the key mathematical concepts that students need to understand when solving the Nina’s Numbers Performance Task in particular.

Students will also need to understand some of the mathematical vocabulary in the Nina’s Numbers Performance Task such as:

1. Skip counting
2. Pattern
3. Number pattern
4. Largest
5. Number sentence
6. Two-digit

Explain and review the vocabulary above within the context of the anchoring instruction activities below. You can also create a chart with the vocabulary above by providing *student-friendly* definitions and examples. For instance,

Math Vocabulary	Definition	Example
skip counting	counting by numbers other than one	Counting by 2s: 2, 4, 6, 8, 10 Counting by 3s: 3, 6, 9, 12, 15

Anchoring Instruction Activities for Nina’s Numbers Performance Task:

Note:

- ***Increase mastery-oriented feedback.*** For each of the instructional activities outlined throughout this document review student responses and provide students with verbal and/or written feedback that is substantive and informative rather than comparative and competitive as a class (i.e., share out) , small groups (i.e., guided math groups) or individually (i.e., conferencing).

Skip Counting and Number Patterns:

- **Activate or supply background knowledge.** Students need to understand and apply skip counting to solve the Nina's Numbers Performance Task. Skip counting is an essential and basic component of mathematics skills. When you skip count, you skip numbers. It is counting by numbers other than one and a faster way of counting large numbers. Skip counting includes counting by 2s, 3s, 5s, 10s, etc. It helps students see patterns in numbers and plays a role in setting the stage for learning multiplication facts. Recognizing and extending patterns in numbers is another key concept students must understand to solve Nina's Numbers. Students have to count according to the pattern and explain what the pattern is and how they derived their response.
- **Offer alternatives to auditory information.** To anchor instruction, explain and model skip counting for students. On a white board use the interactive number chart provided at this website: <http://www.apples4theteacher.com/math/games/100-number-chart-one.html#interactive100chart>. Within this interactive chart, you can click on any number to shade it in with a color to demonstrate skip counting (instead of the white board, you may also use an overhead projector with a 100 chart transparency and shade it with overhead markers to model skip counting). You can start with counting by 2s then progress to counting by 3s, 5s, 10s (do not complete the entire chart since students will complete them in pairs or groups). Point out to students that when counting by 2s, 3s, etc. there is a number pattern (i.e., when counting by 2s, you are adding two each time—that is a number pattern).
- **Maximize transfer and generalization.** After demonstrating and explaining skip counting to students, you can have students fill in a skip counting grid to practice counting by 2s, 3s, 5s and 10s. Pair or group students, provide each pair or group with a number grid that needs to be completed and a number 100 chart and number line that they can refer to for assistance. For example, you may start out simplistically as in the example below where students have to skip count by 2s up to 50. They can fill in the numbers in the blank boxes. Then have students practice counting by 3s, 5s, and 10s. For instance,

2		6		
12	14		18	
	24			30
		36	38	

3		9		15
18		24	27	
33	36			45
	51		57	

Use the blank number grid below to develop your own skip counting activity:

- **Illustrate through multiple media.** Instead of, or in addition to, the skip counting grid above provide students with a 100 chart and have them practice counting by 2s, 3s, 5s, and 10s—they will complete the skip counting activity from where you left off. For instance, you may have demonstrated counting by 2s up to 30 as in the chart below.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

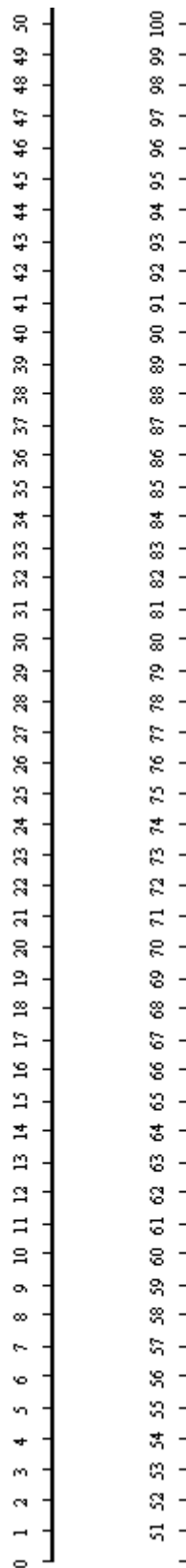
- **Maximize transfer and generalization.** Have students continue counting by 2s up to 100 by shading in their charts with a yellow crayon. Repeat this activity with students with counting by 3s, 5s, 10s using the 100 chart to model and then having students work in pairs or groups to complete their own 100 chart. After students become more comfortable with skip counting, you may have them count by 2s, 3s, 5s and 10s individually (for additional individual practice have students complete this activity for homework). Below is a number chart you can use with your students.

100 Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- **Use multiple media for communication.** To model and reinforce skip counting in another way, use a number line to count by 2s, 3s, 5s and 10s. Again, start by modeling skip counting by 2s up to 40 or so and have students complete the rest in pairs or groups on a number line. As students become confident, have them practice skip counting individually and provide them with their own number lines. Again, explain to students that when you count by 2s, the pattern is adding 2. There is a sample number line provided below but it should be enlarged for students.

If students need more concrete experience with skip counting, you can also have students form a human number line. Each student can hold up a number. For instance, if the students are counting by 2s, **Student A** can hold up the number 2, **Student B** can hold up the number 4, **Student C** the number 6, etc... OR you can create a number line on the floor and have **Student A** stand on the number 2, **Student B** stand on number 4, etc... The font on the number line below should be enlarged and can be color-coded (on a white board, chart paper, etc.) so that students can clearly see numbers and their relationship.

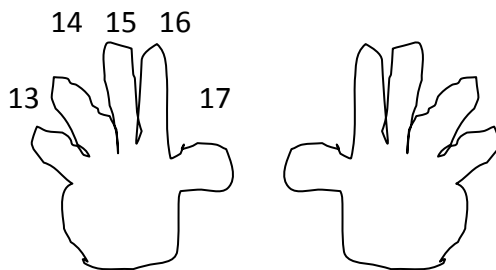
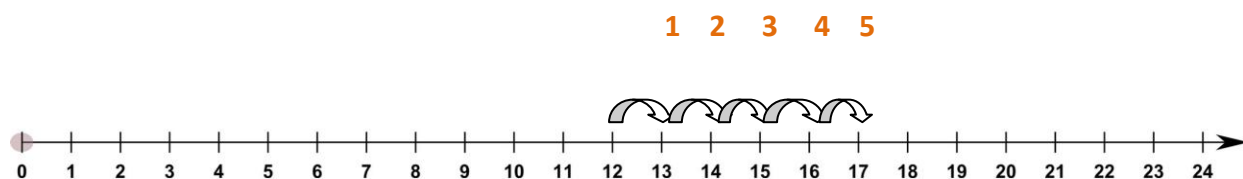


<http://www.helpingwithmath.com/printables/others/lin0301number19.htm>

- **Use multiple tools for construction and composition.** To build on the concept of skip counting, work on extending numerical patterns with students. Provide students with samples of a numerical pattern and have them figure out with you what the pattern is. For example, 2, 7, 12, 17, ____ . Ask students what the next number is and to describe the pattern. Show students how to use a number chart and a number line to figure out what the pattern is. Counters can also be used to place on the number chart (you can use a document camera to demonstrate or chart paper with paper counters or objects that can be attached to the chart w/masking tape).

To further extend this activity and to provide students with practice to solve the Nina's Number Performance Task, show them this example written out differently. For example, rather than 2, 7, 12, 17, ____, Show them 2, ____, 12, 17, ____, 22; ask students how they would figure out the number pattern (adding 5) if they were given the numbers arranged in this fashion. Lead students in determining that they would have to count from 12 to 17 on the number grid/chart (they can place counters on the numbers 13, 14, 15, 16 and 17 to come up with the pattern of adding 5), number line (they can count the humps drawn on the number line to come up with the pattern of adding 5) or on their fingers as shown below (starting with saying 12 and counting 13, 14, 15, 16, 17 on their fingers). For example,

2		12	17		22
---	--	----	----	--	----

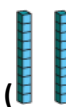


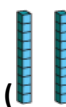
- **Maximize transfer and generalization.** Provide students with various examples and then allow them to practice. For instance, you may demonstrate and guide students in figuring out the following examples by using the number grid/chart, the number line and fingers (use your fingers, draw fingers on the board and write the numbers they have to count above the drawn fingers): 7, __, 11, 13, __, 17, __, 21 (the pattern is adding 2); 5, 8, __, 14, __, 20, __, 26 (the pattern is adding 3); 55, __, 65, 70, __, 80, __, 90 (the pattern is adding 5).

Note: Please see the last page of this document for ideas on number pattern games and puzzles for math center activities.

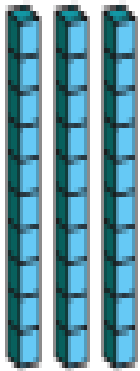

Place Value and Number Sentence Activities:

- **Activate or supply background knowledge.** Another concept students need to understand and apply to be successful in the Nina's Numbers Performance Task, is place value up to 100. Place value helps us make daily decisions as to what is more or less. In real life, this translates into what costs more or less. Place value of a digit or numeral depends on its place in a number. For students to understand place value, they should be able to count numbers, skip count, and count by tens and hundreds.
- **Use multiple media for communication.** Model place value for students by using counters, clips, rubber bands and/or manipulatives, etc. Count by ones until you get to ten and form a group of ten. Continue grouping objects into groups of ten and some ones. For example, make five groups of ten and three ones. Elicit from students the numbers of groups of tens that you made and how many ones there are. Lead students to be able to say how many are all together in the group of objects. Repeat this type of activity until students have mastered this concept.




Next show students that each group can also be represented by base ten materials (). Do some additional problems using base ten materials for reinforcement.

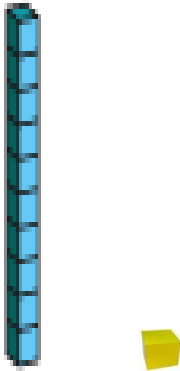
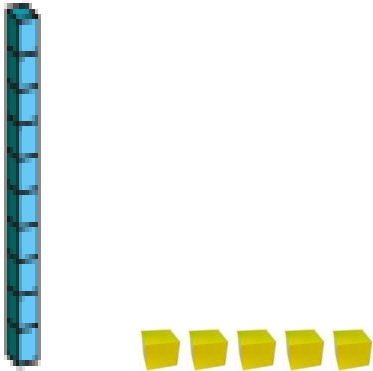
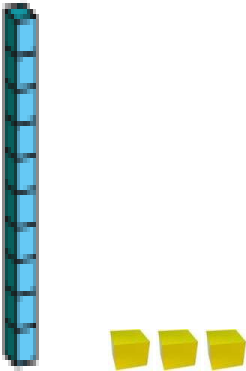
- **Guide information processing, visualization, and manipulation.** Next, model the actual representation of this concept on paper with numbers and words. Students need to understand that the digit in the column tells them the size of the group or place value. Students working in pairs or groups will use the chart below to fill in the missing columns. Model the first example of 35. Demonstrate and verbalize with students that three tens equals 30, five ones equals five and finally that $30 + 5 = 35$ using a chart such as the one below.

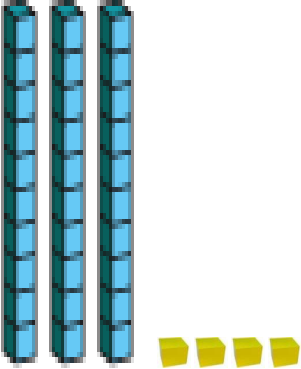
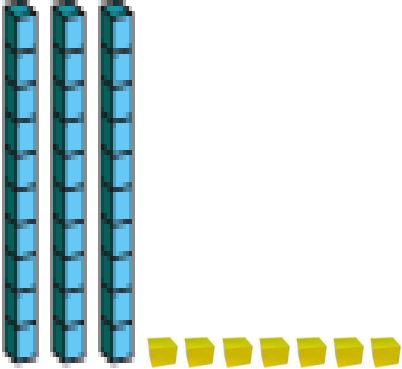
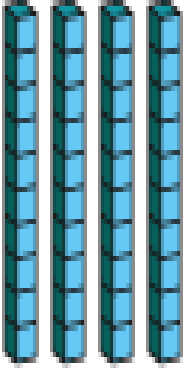
Tens	Ones	Number
		35
$\underline{30} + \underline{5} = \underline{35}$		

- **Support planning and strategy development.** Before students begin practicing in pairs or groups other examples you provide them with such as the one in the chart below, ensure that they understand what they are being asked to do by explaining in words the example you just modeled.

Tens	Ones	Number
		71
		

The following worksheets can be used for reinforcement and additional practice of these critical concepts. In reviewing students work, students should explain their response. Use the charts below to expand student understanding of place value. Working in pairs or groups students can complete the following examples in the tables below. Ask students which number is the largest and why.

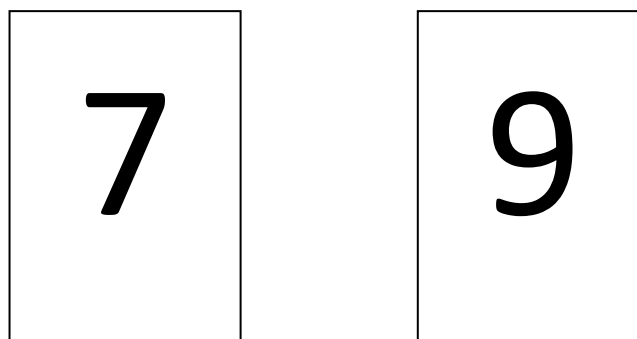
 <p>1 ten 1 one</p> <p>$10 + 1 =$</p> <table border="1"> <thead> <tr> <th>tens</th> <th>ones</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> </tbody> </table>	tens	ones	1	1	 <p>1 ten ___ ones</p> <p>$10 + 5 =$</p> <table border="1"> <thead> <tr> <th>tens</th> <th>ones</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> </tr> </tbody> </table>	tens	ones	1		 <p>1 ten ___ ones</p> <p>$10 + 3 =$</p> <table border="1"> <thead> <tr> <th>tens</th> <th>ones</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	tens	ones		
tens	ones													
1	1													
tens	ones													
1														
tens	ones													

 <p> ___ ten ___ ones 30 + 4 = tens ones </p> <table border="1" data-bbox="191 1075 581 1171"> <tr> <td></td> <td>4</td> </tr> </table>		4	 <p> ___ tens ___ ones ___ + ___ = tens ones </p> <table border="1" data-bbox="613 1075 1010 1171"> <tr> <td>3</td> <td></td> </tr> </table>	3		 <p> ___ tens 40 + 0 = tens ones </p> <table border="1" data-bbox="1052 1075 1432 1171"> <tr> <td></td> <td></td> </tr> </table>		
	4							
3								

- **Clarify vocabulary and symbols. Illustrate through multiple media.** After the students have mastered the concept of place value for the ones and tens place, introduce the concept of *more* and *less*. Students will be comparing two-digit numbers and their values. For example, which number is more and why (i.e., 95 or 59). Use the base ten manipulatives and the place value chart below to explain that the correct number is 95 because 9 tens are greater than 5 tens. Model your thinking.

Tens	Ones	Number

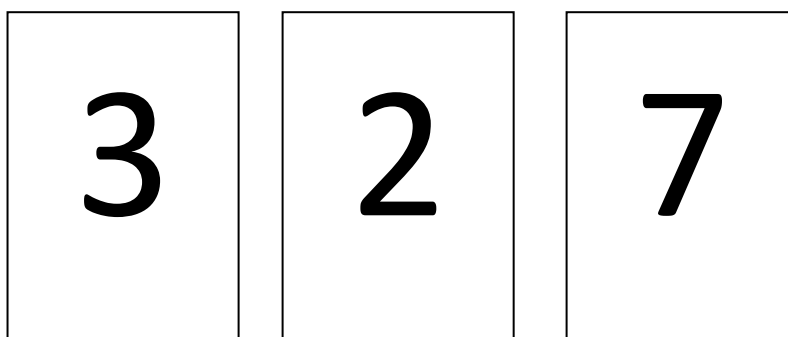
- **Vary the methods for response and navigation.** As a follow up and to familiarize students with the Nina's Numbers Performance Task, give pairs of students two number cards. As in the example below, students may be given number cards with a 7 and 9. These two number cards can also be shown on a white board (Smart Board).



Ask students to decide what is the largest two-digit number that can be made using the two cards? Have students demonstrate with their cards. Students should be able to explain that 97 is larger than 79 because 9 tens equals 90 and 7 tens equals 70 and 90 is larger than 70. Accept any variation of this type of response. Again, students may need to use base ten manipulatives and a place value chart as shown below to figure out the correct response.

Tens	Ones	Number

- **Maximize transfer and generalization.** Repeat this type of activity as needed and gradually introduce making a two-digit number with three number cards such as:



Demonstrate creating all the two-digit numbers you can make with the three number cards. Place one card under the Tens column and one card under the Ones column and continue the variations of numbers that can be made (i.e., 32, 23, 27, 72, 37, 73) again using the place value chart above and listing the numbers.

- **Highlight patterns, critical features, big ideas, and relationships.** Once students have helped you make all the various two-digit number combinations possible , guide students in ordering these numbers from the smallest to largest by using the white board OR by using large index cards (masking tape on the back of the card) with all the various numbers written and placing them in the correct order on a board. Have students refer to a 100 number grid/chart and/or a number line to determine how to order the two-digit numbers from the smallest to the largest (students may also use base ten manipulatives). For example:

23

27

32

37

72

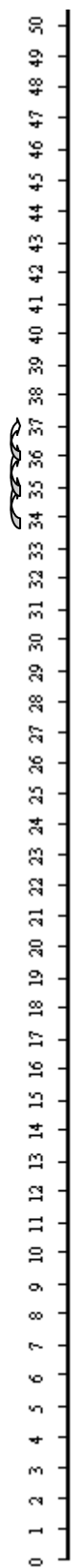
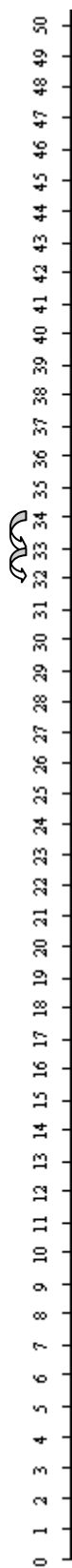
73

- **Use multiple media for communication.** After helping students determine the largest number, use these same cards and ask students what two-digit number can be made that is closest to 34. Use a number chart and/or number line and/or your fingers (both your own fingers and an illustration) to help students figure out which number is closest to 34 (you may use the white board and the interactive number chart provided earlier at:

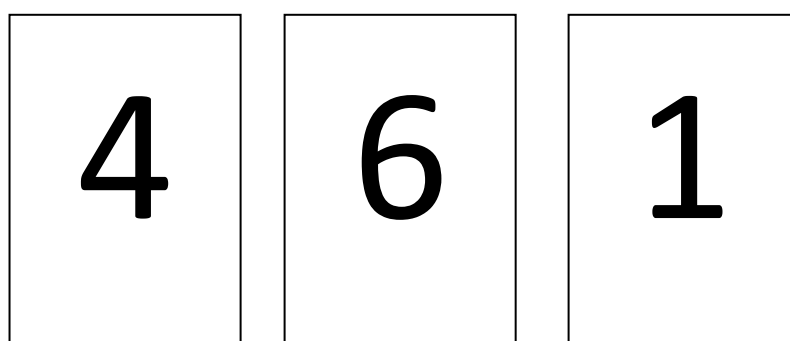
<http://www.apples4theteacher.com/math/games/100-number-chart-one.html#interactive100chart>

OR use the number chart provided below). You can shade in the number 34 in one color and then shade in the numbers made with the number cards in another color to determine which two-digit number is closest to 34 (see number chart shown below). Ask students questions to help them determine that 32 is the closest number to 34 and why. After eliciting responses from students, model your thinking in pictures, words and numbers.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



- **Foster collaboration and community.** After modeling and demonstrating two-digit numbers that can be made from three number cards and which is the largest, provide students with a different set of three number cards (i.e., 4, 6, and 1) and a place value chart. Allow them to work in pairs or groups to figure out all the two-digit numbers that can be made and list them (i.e., 46, 64, 41, 14, 61, and 16) and which number is the largest (64). Students should record their thinking using pictures, written response and numbers just as you modeled previously. While students are working, provide support. After students complete this practice activity, review with the entire class and support students in explaining their thinking, pictures and written responses to their peers. Use the following three number cards, place value chart (supply base ten manipulatives or use the cut-outs at the end of this document) and number chart and/or number line.



Tens	Ones	Number

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Maximize transfer and generalization.** Finally, tell students to use the same three number cards (4, 6, and 1) to determine what two-digit number can be made that is closest to 53. Give students a number chart and/or number line to help students figure out which number is closest to 53. Have students shade in the number 53 with one color (let's say yellow) and then shade in all the other two-digit numbers that can be made with another color (perhaps blue). Then have students figure out which number is closest to 53. Students will need to either count on the chart, number line or on their fingers to figure out if 46 or 61 is closest to 53 (or any other strategy you can think of to steer them to the correct response). After students complete the activity, review and elicit responses from them demonstrating their responses on the interactive chart using a white board at: <http://www.apples4theteacher.com/math/games/100-number-chart-one.html#interactive100chart> OR use the number chart provided below and copy onto a transparency. For example,

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

A blank sheet of graph paper featuring a uniform grid of small squares. The grid is composed of thin, light gray lines. A thicker vertical line runs down the center of the page, dividing it into two equal halves. At the bottom of the page, there are several horizontal lines forming a header or footer area, and a series of short vertical tick marks along the very bottom edge.

Division of Students with Disabilities and English Language Learners

Additional Resources and websites:

1. <http://www.learnzillion.com/>
2. <http://www.apples4theteacher.com/math/games/100-number-chart-one.html#interactive100chart>
3. <http://www.squidoo.com/counting>
4. http://www.abcy.com/connect_the_dots_computer_3s.htm
5. <http://www.studyzone.org/testprep/math4/b/skipcounting3s2l.cfm>
6. <http://www.youtube.com/watch?v=MWxPKnLtnus> (Counting by 3's song)
7. http://www.softschools.com/math/worksheets/count_by_2_and3.jsp

Missing Number Game (reinforce number patterns):



Missing Numbers

If your students enjoyed the [Swiper](#) activities, they'll be pleased to meet Rocky Raccoon who also steals numbers from the hundred board. Rocky sometimes makes puzzles of the hundred board and he drops some of the pieces as he leaves. Students will love the challenge of writing in the missing numbers to outsmart Rocky Raccoon. They will practice identifying and using the number patterns in the 100 board. They will also practice writing 2-digit numbers as they fill in the missing numbers.

- Download [PDF Hundred Board Puzzles](#)

Math Center Activities:

- Students can make their own hundred board puzzles by cutting up a hundred board.
- Students can also be challenged to create their own Swiper or Rocky Raccoon character who steals numbers. They can create puzzles for classmates to solve.
- Students can create puzzle pieces with missing numbers for classmates to solve by using hundred board patterns to write the correct numbers in the puzzle piece.

From: <http://www.mathwire.com/100board/hbpuzzles.pdf>